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10/043,244	01/14/2002	Satoru Katagami	111373	9429

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EXAMINER	
KOCH, GEORGE R	

ART UNIT	PAPER NUMBER
1734	

DATE MAILED: 03/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/043,244	Applicant(s) KATAGAMI ET AL.	
	Examiner George R. Koch III	Art Unit 1734	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 2/24/06.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-7,13,14,16-20,23 and 25 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-7,13,14,16-20,23 and 25 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/24/2006 has been entered.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-5, 13, 14, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maramuto (6,290,352) and EITHER of Jang (US 6,180,049) or Sekiya (US 2001/0024227 A1).

Marumoto discloses an apparatus for discharging a material to an object, comprising an ink jet head that contains a plurality of heads each having a nozzle row (see Figure 1, 16 and 17, and see column 13, lines 60-67), the nozzle row having an arrangement of a plurality of nozzles (see Figures 16 and 17); a supporting mechanism

(Figure 1, item 90a) that supports the plurality of heads; a mechanism that scans at least one of the object and the supporting mechanism relative to each other in a scanning direction (X-Y-theta stage 52), wherein the nozzle row is inclined relaitive to the scanning to the scanning direction (see Figures 16 and 17).

Maramuto does not disclose that a control device that moves the ink jet head, the control device including first, second and third motors that rotate about the first, second and third orthogonal axes, respectively, the third axis being parallel to the scanning direction. Maramuto merely discloses moving the stage in the X, Y and theta directions. However, one in the art would immediately recognize that it is the relative movement that determines discharge placement, and that each is an equivalent of the other.

Jang (directed towards deposition onto microelectronic devices - see column, lines 15-9) discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see column 15, lines 37-54) over the substrate by the use of first, second and third motor devices (column 9, lines 17-44) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system), each capable of oscillating and rotating the ink jet head around the three claimed axis (parallel to the scanning direction, perpendicular to the scanning direction, and orthogonal . Jang discloses linear motion devices as a preferred motor system, but also discloses rotational motors such servomotors as alternatives.

Similarly, Sekiya discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see paragraph 0080) over the substrate by

the use of first and second motor devices (Figure 1, items 18 and 19 - and see paragraphs 0070-0090) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system), each capable of oscillating and rotating the ink jet head around two of the claimed axis. One in the art would appreciate, as disclosed in the primary reference, that controlling of the third axis can be done, and further appreciate that it can be done by a rotary scanning motor.

One in the art would recognize that the use of systems that move the deposition head would eliminate the need for movement of larger substrates, which would require larger floor space (since the apparatus would required to move the substrate over a space roughly equal to one and one-half to two times the linear dimensions of the substrate. The deposition head, if being moved, only needs to have movement capabilities ranging over the substrate). One in the art would recognize that such movement and control system would enable proper positioning of the substrate and reduce apparatus floor space. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a control device that moves the ink-jet head including first, second and third motors that rotate about first, second and third orthogonal axes, the third axis being parallel to the scanning direction in order to eliminate the need to move the substrate and thus reduce apparatus size.

As to claim 2, Marumoto discloses that a plurality of the heads being supported obliquely (as shown in Figure 17) relative to a longitudinal direction of the supporting mechanism.

As to claim 3, Marumoto discloses and is capable at least one of the object and the supporting mechanism being scanned relative to the other in at least one of a main scanning direction and a sub-scanning direction crossing the main scanning direction (see angled scanning in Figure 12).

As to claim 4, Maramuto discloses the plurality of the heads having substantially a same nozzle pitch of the nozzle rows, and substantially a same inclination angle of the nozzle rows (see Figure 12).

As to claim 5, Marumoto as applied in claim 1 above discloses an apparatus for discharging a material to an object, comprising a plurality of heads (see Figure 1, 16 and 17) each having a nozzle row, the nozzle row having an arrangement of a plurality of nozzles; a supporting mechanism (item 90a) that supports the plurality of the heads, a mechanism that scans at least one of the object and the supporting mechanism relative to each other (X-Y-theta table 52); and a mechanism (the pivot in support 90a) that controls an angle formed by at least one of the nozzle rows and the scanning direction.

Maramuto as applied above does not disclose that a control device that moves the ink jet head, the control device including first, second and third motors that rotate about the first, second and third orthogonal axes, respectively, the third axis being parallel to the scanning direction. Maramuto merely discloses moving the stage in the X, Y and theta directions. However, one in the art would immediately recognize that it is the relative movement that determines discharge placement, and that each is an equivalent of the other.

Jang (directed towards deposition onto microelectronic devices - see column, lines 15-9) discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see column 15, lines 37-54) over the substrate by the use of first, second and third motor devices (column 9, lines 17-44) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system). Jang discloses linear motion devices as a preferred motor system, but also discloses rotational motors such servomotors as alternatives.

Similarly, Sekiya discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see paragraph 0080) over the substrate by the use of first and second motor devices (Figure 1, items 18 and 19 - and see paragraphs 0070-0090) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system), each capable of oscillating and rotating the ink jet head around two of the claimed axis. One in the art would appreciate, as disclosed in the primary reference, that controlling of the third axis can be done, and further appreciate that it can be done by a rotary scanning motor.

One in the art would recognize that the use of systems that move the deposition head would eliminate the need for movement of larger substrates, which would require larger floor space (since the apparatus would required to move the substrate over a space roughly equal to one and one-half to two times the linear dimensions of the substrate. The deposition head, if being moved, only needs to have movement

capabilities ranging over the substrate). One in the art would recognize that such movement and control system would enable proper positioning of the substrate and reduce apparatus floor space. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a control device that moves the ink-jet head including first, second and third motors that rotate about first, second and third orthogonal axes, the third axis being parallel to the scanning direction in order to eliminate the need to move the substrate and thus reduce apparatus size.

As to claim 13, the material worked with does not added patentable weight. Marumoto is capable of and discloses dispensing a color filter material.

As to claim 14, the material worked with does not added patentable weight. Marumoto is capable of dispensing an EL luminsescent material.

As to claim 16, Marumoto discloses an apparatus for producing a color filter, comprising: a plurality of heads each having a nozzle row (see Figures 1, 16, and 17), the nozzle row including an arrangement of a plurality of nozzles; a mechanism that supplies a filter material to the heads (see Figure 3 and column 5, line 66 to column 6, line26); and a supporting mechanism that supports the plurality of the heads (item 90a), wherein the supporting mechanism supports the plurality of the heads in an inclined state (the pivot capability of the support - see column 5, lines 24-37).

Maramuto does not disclose that a control device that moves the ink jet head, the control device including first, second and third motors that rotate about the first, second and third orthogonal axes, respectively, the third axis being parallel to the scanning

direction. Maramuto merely discloses moving the stage in the X, Y and theta directions. However, one in the art would immediately recognize that it is the relative movement that determines discharge placement, and that each is an equivalent of the other.

Jang (directed towards deposition onto microelectronic devices - see column, lines 15-9) discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see column 15, lines 37-54) over the substrate by the use of first, second and third motor devices (column 9, lines 17-44) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system). Jang discloses linear motion devices as a preferred motor system, but also discloses rotational motors such servomotors as alternatives.

Similarly, Sekiya discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see paragraph 0080) over the substrate by the use of first and second motor devices (Figure 1, items 18 and 19 - and see paragraphs 0070-0090) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system), each capable of oscillating and rotating the ink jet head around two of the claimed axis. One in the art would appreciate, as disclosed in the primary reference, that controlling of the third axis can be done, and further appreciate that it can be done by a rotary scanning motor.

One in the art would recognize that the use of systems that move the deposition head would eliminate the need for movement of larger substrates, which would require

larger floor space (since the apparatus would required to move the substrate over a space roughly equal to one and one-half to two times the linear dimensions of the substrate. The deposition head, if being moved, only needs to have movement capabilities ranging over the substrate). One in the art would recognize that such movement and control system would enable proper positioning of the substrate and reduce apparatus floor space. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a control device that moves the ink-jet head including first, second and third motors that rotate about first, second and third orthogonal axes, the third axis being parallel to the scanning direction in order to eliminate the need to move the substrate and thus reduce apparatus size.

As to claim 17, the support mechanism is capable of supporting the heads in a fixed state.

As to claim 18, the plurality of heads (i.e, the R, G, and B heads) has substantially the same nozzle pitch of the nozzle rows and substantially a same inclination angle of the nozzle rows.

4. Claims 1-7, 13, 14, 16-20, 23 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akahira (US 6,145,981) and EITHER of Jang (US 6,180,049) or Sekiya (US 2001/0024227 A1).

Akahira discloses an apparatus for discharging a material to an object, comprising an inkjet head that contains a plurality of heads each having a nozzle row (Figures 19-25, item 305, and especially Figure 22), the nozzle row having an

arrangement of a plurality of nozzles (see Figure 22, items B1-B7, G1-G7, and R1-R7); a supporting mechanism (Figure 21, items 325-327) that supports (and move) the plurality of heads; a mechanism that scans at least one of the object and the supporting mechanism relative to each other in a scanning direction (see column 15-18 and Figure 22, arrow S), wherein the nozzle row is inclined relative to the scanning to the scanning direction (see Figure 22). Furthermore, Akahira discloses that the apparatus can be manufactures as a combination of a plurality of recording head to form the full line (see column 20, lines 26-33).

Akahira does not disclose that a control device that moves the ink jet head, the control device including first, second and third motors that rotate about the first, second and third orthogonal axes, respectively, the third axis being parallel to the scanning direction. Akahira merely discloses moving the head in the X, Y and theta directions, but does not suggest the Z direction.

Jang (directed towards deposition onto microelectronic devices - see column, lines 15-9) discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see column 15, lines 37-54) over the substrate by the use of first, second and third motor devices (column 9, lines 17-44) in the X, Y and Z directions instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system). Jang discloses linear motion devices as a preferred motor system, but also discloses rotational motors such servomotors as alternatives. Jang discloses that Z axis movements are used to ensure relative deposition heights (see column 9).

Similarly, Sekiya discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see paragraph 0080) over the substrate by the use of first and second motor devices (Figure 1, items 18 and 19 - and see paragraphs 0070-0090) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system), each capable of oscillating and rotating the ink jet head around two of the claimed axis. One in the art would appreciate, as disclosed in the primary reference, that controlling of the third axis can be done, and further appreciate that it can be done by a rotary scanning motor.

One in the art would recognize that the use of systems that move the deposition head would eliminate the need for movement of larger substrates, which would require larger floor space (since the apparatus would required to move the substrate over a space roughly equal to one and one-half to two times the linear dimensions of the substrate. The deposition head, if being moved, only needs to have movement capabilities ranging over the substrate). One in the art would recognize that such movement and control system would enable proper positioning of the substrate and reduce apparatus floor space. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a control device that moves the ink-jet head including first, second and third motors that rotate about first, second and third orthogonal axes, the third axis being parallel to the scanning direction in order to eliminate the need to move the substrate and thus reduce apparatus size.

As to claim 2, Akahira discloses that a plurality of the heads being supported obliquely (as shown in Figure 22) relative to a longitudinal direction of the supporting mechanism.

As to claim 3, Akahira discloses and is capable at least one of the object and the supporting mechanism being scanned relative to the other in at least one of a main scanning direction and a sub-scanning direction crossing the main scanning direction (see angled scanning in Figure 22).

As to claim 4, Akahira is capable of discloses the plurality of the heads having substantially a same nozzle pitch of the nozzle rows, and substantially a same inclination angle of the nozzle rows (see Figure 22).

As to claim 5, Akahira as applied in claim 1 above discloses an apparatus for discharging a material to an object, comprising a plurality of heads each having a nozzle row (see Figure 22), the nozzle row having an arrangement of a plurality of nozzles (see Figure 22); a supporting mechanism (bottom of items 325, 326, and 327) that supports the plurality of the heads, a mechanism that scans at least one of the object and the supporting mechanism relative to each other; and a mechanism (items 325, 326, 327) that controls an angle formed by at least one of the nozzle rows and the scanning direction.

Akahira does not disclose that a control device that moves the ink jet head, the control device including first, second and third motors that rotate about the first, second and third orthogonal axes, respectively, the third axis being parallel to the scanning

direction. Akahira merely discloses moving the head in the X, Y and theta directions, but does not suggest the Z direction.

Jang (directed towards deposition onto microelectronic devices - see column, lines 15-9) discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see column 15, lines 37-54) over the substrate by the use of first, second and third motor devices (column 9, lines 17-44) in the X, Y and Z directions instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system). Jang discloses linear motion devices as a preferred motor system, but also discloses rotational motors such servomotors as alternatives. Jang discloses that Z axis movements are used to ensure relative deposition heights (see column 9).

Similarly, Sekiya discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see paragraph 0080) over the substrate by the use of first and second motor devices (Figure 1, items 18 and 19 - and see paragraphs 0070-0090) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system), each capable of oscillating and rotating the ink jet head around two of the claimed axis. One in the art would appreciate, as disclosed in the primary reference, that controlling of the third axis can be done, and further appreciate that it can be done by a rotary scanning motor.

One in the art would recognize that the use of systems that move the deposition head would eliminate the need for movement of larger substrates, which would require

larger floor space (since the apparatus would required to move the substrate over a space roughly equal to one and one-half to two times the linear dimensions of the substrate. The deposition head, if being moved, only needs to have movement capabilities ranging over the substrate). One in the art would recognize that such movement and control system would enable proper positioning of the substrate and reduce apparatus floor space. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a control device that moves the ink-jet head including first, second and third motors that rotate about first, second and third orthogonal axes, the third axis being parallel to the scanning direction in order to eliminate the need to move the substrate and thus reduce apparatus size.

As to claim 6, Akahira discloses a mechanism for controlling a spacing between the plurality of the nozzle rows (items 326, 326, and 327).

As to claim 7, Akahira discloses the mechanism (items 325, 326, and 327) that is capable of controlling the angle between at least one nozzle row and the scanning direction controlling the angle in such a manner that the plurality of the heads have substantially the same nozzle pitch of the nozzle rows and substantially the same inclination angle of the nozzle rows.

As to claim 13, the material worked with does not added patentable weight. Akahira is capable of and discloses dispensing a color filter material.

As to claim 14, the material worked with does not added patentable weight. Akahira is capable of dispensing an EL luminsescent material.

As to claim 16, Akahira discloses an apparatus for producing a color filter, comprising: a plurality of heads each having a nozzle row (see Figure 21 and 22), the nozzle row including an arrangement of a plurality of nozzles (see Figure 22, items R1-7, G1-7, and B1-7); a mechanism that supplies a filter material to the heads (see column 19, line 48 to column 20, line 25, which discloses nozzle supply lines); and a supporting mechanism that supports the plurality of the heads (items 325, 326, and 327), wherein the supporting mechanism supports the plurality of the heads in an inclined state (see column 16, lines 13-19).

Akahira does not disclose that a control device that moves the ink jet head, the control device including first, second and third motors that rotate about the first, second and third orthogonal axes, respectively, the third axis being parallel to the scanning direction. Akahira merely discloses moving the head in the X, Y and theta directions, but does not suggest the Z direction.

Jang (directed towards deposition onto microelectronic devices - see column, lines 15-9) discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see column 15, lines 37-54) over the substrate by the use of first, second and third motor devices (column 9, lines 17-44) in the X, Y and Z directions instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system). Jang discloses linear motion devices as a preferred motor system, but also discloses rotational motors such servomotors as alternatives. Jang discloses that Z axis movements are used to ensure relative deposition heights (see column 9).

Similarly, Sekiya discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see paragraph 0080) over the substrate by the use of first and second motor devices (Figure 1, items 18 and 19 - and see paragraphs 0070-0090) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system), each capable of oscillating and rotating the ink jet head around two of the claimed axis. One in the art would appreciate, as disclosed in the primary reference, that controlling of the third axis can be done, and further appreciate that it can be done by a rotary scanning motor.

One in the art would recognize that the use of systems that move the deposition head would eliminate the need for movement of larger substrates, which would require larger floor space (since the apparatus would required to move the substrate over a space roughly equal to one and one-half to two times the linear dimensions of the substrate. The deposition head, if being moved, only needs to have movement capabilities ranging over the substrate). One in the art would recognize that such movement and control system would enable proper positioning of the substrate and reduce apparatus floor space. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a control device that moves the ink-jet head including first, second and third motors that rotate about first, second and third orthogonal axes, the third axis being parallel to the scanning direction in order to eliminate the need to move the substrate and thus reduce apparatus size.

As to claim 17, the support mechanism is capable of supporting the heads in a fixed state.

As to claim 18, the plurality of heads (i.e, the R, G, and B heads) has substantially the same nozzle pitch of the nozzle rows and substantially a same inclination angle of the nozzle rows (as shown in Figure 22).

As to claim 19, Akahira discloses an apparatus for producing a color filter, comprising: a plurality of heads each having a nozzle row (Figure 21 and 22), the nozzle row including an arrangement of a plurality of nozzles (Figure 22, items R1-7, G1-7, and B1-7); a mechanism that supplies a filter material to the heads (see column 19, line 48 to column 20, line 25, which discloses nozzle supply lines); a supporting mechanism that supports the plurality of the heads (itmes 325, 326, and 327), a main scanning mechanism that moves the supporting mechanism by main scanning; a sub-scanning mechanism that moves the supporting mechanism by sub-scanning (specifically, Akahira discloses moving the substrate, but also discloses that the setup can be reversed such that the substrate is stationary and the nozzle head scans - see column 19, lines 27-30); a nozzle row angle control mechanism that controls the inclination angles of the plurality of the nozzle rows (the theta component of items 325, 326, and 327); and a nozzle row spacing control mechanism that controls a spacing between the plurality of the nozzle rows (the y and z axis component of items 326 and 327).

Akahira does not disclose that a control device that moves the ink jet head, the control device including first, second and third motors that rotate about the first, second and third orthogonal axes, respectively, the third axis being parallel to the scanning

direction. Akahira merely discloses moving the head in the X, Y and theta directions, but does not suggest the Z direction.

Jang (directed towards deposition onto microelectronic devices - see column, lines 15-9) discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see column 15, lines 37-54) over the substrate by the use of first, second and third motor devices (column 9, lines 17-44) in the X, Y and Z directions instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system). Jang discloses linear motion devices as a preferred motor system, but also discloses rotational motors such servomotors as alternatives. Jang discloses that Z axis movements are used to ensure relative deposition heights (see column 9).

Similarly, Sekiya discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see paragraph 0080) over the substrate by the use of first and second motor devices (Figure 1, items 18 and 19 - and see paragraphs 0070-0090) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system), each capable of oscillating and rotating the ink jet head around two of the claimed axis. One in the art would appreciate, as disclosed in the primary reference, that controlling of the third axis can be done, and further appreciate that it can be done by a rotary scanning motor.

One in the art would recognize that the use of systems that move the deposition head would eliminate the need for movement of larger substrates, which would require

larger floor space (since the apparatus would required to move the substrate over a space roughly equal to one and one-half to two times the linear dimensions of the substrate. The deposition head, if being moved, only needs to have movement capabilities ranging over the substrate). One in the art would recognize that such movement and control system would enable proper positioning of the substrate and reduce apparatus floor space. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a control device that moves the ink-jet head including first, second and third motors that rotate about first, second and third orthogonal axes, the third axis being parallel to the scanning direction in order to eliminate the need to move the substrate and thus reduce apparatus size.

As to claim 20, Akahira discloses that the plurality of heads (i.e, the R, G, and B heads) has substantially the same nozzle pitch of the nozzle rows and substantially a same inclination angle of the nozzle rows (see Figure 22).

As to claim 23, Akahira discloses an apparatus capable of and disclosed as being used for (column 1, line 18) manufacturing a liquid crystal device, comprising: a plurality of heads each having a nozzle row (Figure 21 and 22), the nozzle row including an arrangement of a plurality of nozzles (Figure 22, items R1-7, G1-7, and B1-7); a mechanism that supplies a filter material to the heads (see column 19, line 48 to column 20, line 25, which discloses nozzle supply structures); a supporting mechanism that supports the plurality of the heads (items 325, 326, and 327), a main scanning mechanism that moves the supporting mechanism by main scanning; and a sub-scanning mechanism that moves the supporting mechanism by sub-scanning

(specifically, Akahira discloses moving the substrate, but also discloses that the setup can be reversed such that the substrate is stationary and the nozzle head scans - see column 19, lines 27-30), wherein the supporting mechanism supports the plurality of the heads in an inclined state (as shown in Figure 22).

Akahira does not disclose that a control device that moves the ink jet head, the control device including first, second and third motors that rotate about the first, second and third orthogonal axes, respectively, the third axis being parallel to the scanning direction. Akahira merely discloses moving the head in the X, Y and theta directions, but does not suggest the Z direction.

Jang (directed towards deposition onto microelectronic devices - see column, lines 15-9) discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see column 15, lines 37-54) over the substrate by the use of first, second and third motor devices (column 9, lines 17-44) in the X, Y and Z directions instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system). Jang discloses linear motion devices as a preferred motor system, but also discloses rotational motors such servomotors as alternatives. Jang discloses that Z axis movements are used to ensure relative deposition heights (see column 9).

Similarly, Sekiya discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see paragraph 0080) over the substrate by the use of first and second motor devices (Figure 1, items 18 and 19 - and see paragraphs 0070-0090) instead of using movement tables (or even splitting the

movements - i.e., having some movement done by the deposition system and some by the table system), each capable of oscillating and rotating the ink jet head around two of the claimed axis. One in the art would appreciate, as disclosed in the primary reference, that controlling of the third axis can be done, and further appreciate that it can be done by a rotary scanning motor.

One in the art would recognize that the use of systems that move the deposition head would eliminate the need for movement of larger substrates, which would require larger floor space (since the apparatus would required to move the substrate over a space roughly equal to one and one-half to two times the linear dimensions of the substrate. The deposition head, if being moved, only needs to have movement capabilities ranging over the substrate). One in the art would recognize that such movement and control system would enable proper positioning of the substrate and reduce apparatus floor space. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a control device that moves the ink-jet head including first, second and third motors that rotate about first, second and third orthogonal axes, the third axis being parallel to the scanning direction in order to eliminate the need to move the substrate and thus reduce apparatus size.

As to claim 25, Akahira (see citations above) discloses an apparatus capable of manufacturing an EL device, comprising a plurality of heads each having a nozzle row (Figure 21 and 22), the nozzle row having an arrangement of a plurality of nozzles; a mechanism that capable of supplying an EL luminescent material to the heads ; a supporting mechanism that supports the plurality of the heads, a main scanning

mechanism that moves the supporting mechanism by main scanning; a sub-scanning mechanism that moves the supporting mechanism by sub-scanning; a nozzle row angle control mechanism that controls the inclination angles of the plurality of the nozzle rows; and a nozzle row distance control mechanism that controls a spacing between the plurality of the nozzle rows.

Akahira does not disclose that a control device that moves the ink jet head, the control device including first, second and third motors that rotate about the first, second and third orthogonal axes, respectively, the third axis being parallel to the scanning direction. Akahira merely discloses moving the head in the X, Y and theta directions, but does not suggest the Z direction.

Jang (directed towards deposition onto microelectronic devices - see column, lines 15-9) discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see column 15, lines 37-54) over the substrate by the use of first, second and third motor devices (column 9, lines 17-44) in the X, Y and Z directions instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system). Jang discloses linear motion devices as a preferred motor system, but also discloses rotational motors such servomotors as alternatives. Jang discloses that Z axis movements are used to ensure relative deposition heights (see column 9).

Similarly, Sekiya discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see paragraph 0080) over the substrate by the use of first and second motor devices (Figure 1, items 18 and 19 - and see

paragraphs 0070-0090) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system), each capable of oscillating and rotating the ink jet head around two of the claimed axis. One in the art would appreciate, as disclosed in the primary reference, that controlling of the third axis can be done, and further appreciate that it can be done by a rotary scanning motor.

One in the art would recognize that the use of systems that move the deposition head would eliminate the need for movement of larger substrates, which would require larger floor space (since the apparatus would required to move the substrate over a space roughly equal to one and one-half to two times the linear dimensions of the substrate. The deposition head, if being moved, only needs to have movement capabilities ranging over the substrate). One in the art would recognize that such movement and control system would enable proper positioning of the substrate and reduce apparatus floor space. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a control device that moves the ink-jet head including first, second and third motors that rotate about first, second and third orthogonal axes, the third axis being parallel to the scanning direction in order to eliminate the need to move the substrate and thus reduce apparatus size.

5. Claims 1-7, 13, 14, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akihara (EP 0832745 A2) and either of Jang (US 6,180,049) or Sekiya (US 2001/0024227 A1).

Akahira discloses an apparatus for discharging a material to an object, comprising a plurality of heads each having a nozzle row (Figures 16, items 204a-c), the nozzle row having an arrangement of a plurality of nozzles (see Figure 17, items 205); a supporting mechanism (Figure 21, items 214) that supports (and move) the plurality of heads; a mechanism that scans at least one of the object and the supporting mechanism relative to each other in a scanning direction (Figure 1, item 51, X-Y-theta table), wherein the nozzle row is inclined relative to the scanning to the scanning direction (see Figure 16-17).

Akahira does not disclose that a control device that moves the ink jet head, the control device including first, second and third motors that rotate about the first, second and third orthogonal axes, respectively, the third axis being parallel to the scanning direction. Akahira merely discloses moving the stage in the X, Y and theta directions. However, one in the art would immediately recognize that it is the relative movement that determines discharge placement, and that each is an equivalent of the other.

Jang (directed towards deposition onto microelectronic devices - see column, lines 15-9) discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see column 15, lines 37-54) over the substrate by the use of first, second and third motor devices (column 9, lines 17-44) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system). Jang discloses linear motion devices as a preferred motor system, but also discloses rotational motors such servomotors as alternatives.

Similarly, Sekiya discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see paragraph 0080) over the substrate by the use of first and second motor devices (Figure 1, items 18 and 19 - and see paragraphs 0070-0090) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system), each capable of oscillating and rotating the ink jet head around two of the claimed axis. One in the art would appreciate, as disclosed in the primary reference, that controlling of the third axis can be done, and further appreciate that it can be done by a rotary scanning motor.

One in the art would recognize that the use of systems that move the deposition head would eliminate the need for movement of larger substrates, which would require larger floor space (since the apparatus would required to move the substrate over a space roughly equal to one and one-half to two times the linear dimensions of the substrate. The deposition head, if being moved, only needs to have movement capabilities ranging over the substrate). One in the art would recognize that such movement and control system would enable proper positioning of the substrate and reduce apparatus floor space. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a control device that moves the ink-jet head including first, second and third motors that rotate about first, second and third orthogonal axes, the third axis being parallel to the scanning direction in order to eliminate the need to move the substrate and thus reduce apparatus size.

As to claim 2, Akahira discloses that a plurality of the heads being supported obliquely (as shown in Figure 16-17) relative to a longitudinal direction of the supporting mechanism.

As to claim 3, Akahira discloses and is capable at least one of the object and the supporting mechanism being scanned relative to the other in at least one of a main scanning direction and a sub-scanning direction crossing the main scanning direction (via items 51).

As to claim 4, Akahira is capable of discloses the plurality of the heads having substantially a same nozzle pitch of the nozzle rows, and substantially a same inclination angle of the nozzle rows (see Figure 17).

As to claim 5, Akahira as applied in claim 1 above discloses an apparatus for discharging a material to an object, comprising a plurality of heads each having a nozzle row (see Figure 16), the nozzle row having an arrangement of a plurality of nozzles (see Figure 17, item 205); a supporting mechanism (item 214) that supports the plurality of the heads, a mechanism that scans at least one of the object and the supporting mechanism relative to each other (item 51); and a mechanism (items item 214, 212a-c and 206a-c) that controls an angle formed by at least one of the nozzle rows and the scanning direction.

Akahira does not disclose that a control device that moves the ink jet head, the control device including first, second and third motors that rotate about the first, second and third orthogonal axes, respectively, the third axis being parallel to the scanning direction. Akahira merely discloses moving the stage in the X, Y and theta directions.

However, one in the art would immediately recognize that it is the relative movement that determines discharge placement, and that each is an equivalent of the other.

Jang (directed towards deposition onto microelectronic devices - see column, lines 15-9) discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see column 15, lines 37-54) over the substrate by the use of first, second and third motor devices (column 9, lines 17-44) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system). Jang discloses linear motion devices as a preferred motor system, but also discloses rotational motors such servomotors as alternatives.

Similarly, Sekiya discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see paragraph 0080) over the substrate by the use of first and second motor devices (Figure 1, items 18 and 19 - and see paragraphs 0070-0090) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system), each capable of oscillating and rotating the ink jet head around two of the claimed axis. One in the art would appreciate, as disclosed in the primary reference, that controlling of the third axis can be done, and further appreciate that it can be done by a rotary scanning motor.

One in the art would recognize that the use of systems that move the deposition head would eliminate the need for movement of larger substrates, which would require larger floor space (since the apparatus would required to move the substrate over a

space roughly equal to one and one-half to two times the linear dimensions of the substrate. The deposition head, if being moved, only needs to have movement capabilities ranging over the substrate). One in the art would recognize that such movement and control system would enable proper positioning of the substrate and reduce apparatus floor space. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a control device that moves the ink-jet head including first, second and third motors that rotate about first, second and third orthogonal axes, the third axis being parallel to the scanning direction in order to eliminate the need to move the substrate and thus reduce apparatus size.

As to claim 6, Akahira discloses a mechanism for controlling a spacing between the plurality of the nozzle rows (the nozzles can be moved along items 214 - see columns 17-18).

As to claim 7, Akahira discloses the mechanism (items items item 214, 212a-c and 206a-c) that is capable of controlling the angle between at least one nozzle row and the scanning direction controlling the angle in such a manner that the plurality of the heads have substantially the same nozzle pitch of the nozzle rows and substantially the same inclination angle of the nozzle rows.

As to claim 13, the material worked with does not added patentable weight. Akahira is capable of and discloses dispensing a color filter material.

As to claim 14, the material worked with does not added patentable weight. Akahira is capable of dispensing an EL luminsescent material.

As to claim 16, Akahira discloses an apparatus for producing a color filter, comprising: a plurality of heads each having a nozzle row (see Figure 1, 16 and 17), the nozzle row including an arrangement of a plurality of nozzles (see Figure 17, item 205); a mechanism that supplies a filter material to the heads (see Figure 3); and a supporting mechanism that supports the plurality of the heads (items 214 and 90a), wherein the supporting mechanism supports the plurality of the heads in an inclined state (see Figures 16 and 17).

Akahira does not disclose that a control device that moves the ink jet head, the control device including first, second and third motors that rotate about the first, second and third orthogonal axes, respectively, the third axis being parallel to the scanning direction. Akahira merely discloses moving the stage in the X, Y and theta directions. However, one in the art would immediately recognize that it is the relative movement that determines discharge placement, and that each is an equivalent of the other.

Jang (directed towards deposition onto microelectronic devices - see column, lines 15-9) discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see column 15, lines 37-54) over the substrate by the use of first, second and third motor devices (column 9, lines 17-44) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system). Jang discloses linear motion devices as a preferred motor system, but also discloses rotational motors such servomotors as alternatives.

Similarly, Sekiya discloses that it is known to control and move the deposition subsystem (which can be an inkjet head - see paragraph 0080) over the substrate by the use of first and second motor devices (Figure 1, items 18 and 19 - and see paragraphs 0070-0090) instead of using movement tables (or even splitting the movements - i.e., having some movement done by the deposition system and some by the table system), each capable of oscillating and rotating the ink jet head around two of the claimed axis. One in the art would appreciate, as disclosed in the primary reference, that controlling of the third axis can be done, and further appreciate that it can be done by a rotary scanning motor.

One in the art would recognize that the use of systems that move the deposition head would eliminate the need for movement of larger substrates, which would require larger floor space (since the apparatus would required to move the substrate over a space roughly equal to one and one-half to two times the linear dimensions of the substrate. The deposition head, if being moved, only needs to have movement capabilities ranging over the substrate). One in the art would recognize that such movement and control system would enable proper positioning of the substrate and reduce apparatus floor space. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a control device that moves the ink-jet head including first, second and third motors that rotate about first, second and third orthogonal axes, the third axis being parallel to the scanning direction in order to eliminate the need to move the substrate and thus reduce apparatus size.

As to claim 17, the support mechanism is capable of supporting the heads in a fixed state.

As to claim 18, the plurality of heads (i.e, the R, G, and B heads) has substantially the same nozzle pitch of the nozzle rows and substantially a same inclination angle of the nozzle rows (as shown in Figure 16 and 17).

6. Claims 19-20, 23 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akihara '745 (EP 0832745) and either of Jang (US 6,180,049) or Sekiya (2001/0024227) as applied to claims 1-7, 13, 14, and 16-18 above, and further in view of Akihara '981 (US 6,145,981).

As to claim 19, Akahira '745 discloses an apparatus for producing a color filter, comprising: a plurality of heads each having a nozzle row (Figure 1, 16, and 17), the nozzle row including an arrangement of a plurality of nozzles (Figure 17, item 205); a mechanism that supplies a filter material to the heads (see Figure 3); a supporting mechanism that supports the plurality of the heads (items 214 and 90a), a nozzle row angle control mechanism that controls the inclination angles of the plurality of the nozzle rows (items 214, 212a-c, and 206a-c); and a nozzle row spacing control mechanism that controls a spacing between the plurality of the nozzle rows (via the slide mechanisms - see columns 17-18).

Akihara '745 does not disclose scanning by moving the supporting member. Akihara '745 scans by moving the substrate. Jang does disclose that the deposition system can be moved, but does not suggest scanning as claimed.

However, Akihara '981, which discloses the same scanning setup, also discloses that it can be substituted with a main scanning mechanism that moves the supporting mechanism by main scanning; a sub-scanning mechanism that moves the supporting mechanism by sub-scanning (specifically, Akahira '981 discloses moving the substrate, but also discloses that the setup can be reversed such that the substrate is stationary and the nozzle head scans - see column 19, lines 27-30). One in the art would appreciate that moving the nozzle, while complicating the ejection profile, would be useful when the substrate becomes too unwieldy to move due to increased floor space required. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have moved the nozzles for scanning purposes in order to coat larger substrates without the need to move the substrates, thus reducing apparatus space.

As to claim 20, Akahira '747 discloses that the plurality of heads (i.e, the R, G, and B heads) has substantially the same nozzle pitch of the nozzle rows and substantially a same inclination angle of the nozzle rows (see Figure 16 and 17).

As to claim 23, Akahira '745 discloses an apparatus capable of and disclosed as being used for (column 1, line 13) manufacturing a liquid crystal device, comprising: a plurality of heads each having a nozzle row (Figure 1, 16, and 17), the nozzle row

including an arrangement of a plurality of nozzles (Figure 17, item 205); a mechanism that supplies a filter material to the heads (Figure 3 and the specification); a supporting mechanism that supports the plurality of the heads (items 90a and 214), wherein the supporting mechanism supports the plurality of the heads in an inclined state (as shown in Figure 16 and 17).

Akihara '745 does not disclose scanning by moving the supporting member. Akihara '745 scans by moving the substrate. Jang does disclose that the deposition system can be moved, but does not suggest scanning as claimed.

However, Akihara '981, which discloses the same scanning setup, also discloses that it can be substituted with a main scanning mechanism that moves the supporting mechanism by main scanning; a sub-scanning mechanism that moves the supporting mechanism by sub-scanning (specifically, Akahira '981 discloses moving the substrate, but also discloses that the setup can be reversed such that the substrate is stationary and the nozzle head scans - see column 19, lines 27-30). One in the art would appreciate that moving the nozzle, while complicating the ejection profile, would be useful when the substrate becomes too unwieldy to move due to increased floor space required. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have moved the nozzles for scanning purposes in order to coat larger substrates without the need to move the substrates, thus reducing apparatus space.

As to claim 25, Akahira '745 (see citations above) discloses an apparatus capable of manufacturing an EL device, comprising a plurality of heads each having a nozzle row (Figures 1, 16, and 17), the nozzle row having an arrangement of a plurality of nozzles; a mechanism that capable of supplying an EL luminescent material to the heads ; a supporting mechanism that supports the plurality of the heads (items 90a and 214), a nozzle row angle control mechanism that controls the inclination angles of the plurality of the nozzle rows (item 214, 212a-c, and 206a-c); and a nozzle row distance control mechanism that controls a spacing between the plurality of the nozzle rows (via the slide mechanism 214, see columns 17-18).

Akihara '745 does not disclose scanning by moving the supporting member. Akihara '745 scans by moving the substrate. Jang does disclose that the deposition system can be moved, but does not suggest scanning as claimed.

However, Akihara '981, which discloses the same scanning setup, also discloses that it can be substituted with a main scanning mechanism that moves the supporting mechanism by main scanning; a sub-scanning mechanism that moves the supporting mechanism by sub-scanning (specifically, Akahira '981 discloses moving the substrate, but also discloses that the setup can be reversed such that the substrate is stationary and the nozzle head scans - see column 19, lines 27-30). One in the art would appreciate that moving the nozzle, while complicating the ejection profile, would be useful when the substrate becomes too unwieldy to move due to increased floor space required. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have moved the nozzles for scanning purposes in order to coat

larger substrates without the need to move the substrates, thus reducing apparatus space.

Response to Arguments

7. Applicant's arguments filed 2/24/2006 have been fully considered but they are not persuasive.

Applicant makes two general arguments with respect to the previous rejections - (1) That Jang is not analogous art (Remarks, pages 9-10, and (2) That Jang does not teach any motion other than linear motion in an X-Y-Z fashion and that it is unreasonably broad to impart rotational/oscillatory motion to the servomotor of Jang.

With respect to the first argument, the Examiner's response is that Jang is at least highly relevant analogous art and more accurately, within the same field of invention. The Examiner is of the belief that applicant has taken a narrowly restricted view of what constitutes the art. Applicant limits the art to "color filter manufacturing methods", when the proper field of endeavor is micro-electronical device manufacturing. Jang is devoted to the manufacture of micro-electronical device, as well as the instant application. The two are even more closely related, since both involve the manufacture of small electrical features on a substrate, using deposition techniques. Therefore, one in the art of the instant application would immediately recognize the various benefits of Jang.

With respect to the second argument, this is unpersuasive. Jang teaches servomotors (at column 9, line 36), and this is a rotational motor that allows for

oscillatory movement around the various claimed axes. Furthermore, it is not unreasonably broad to impart the rotational and oscillatory motion; rather, applicant's interpretation of the claim in the arguments to the patent office are unreasonably narrow. The X-Y-Z motions, in combination, result in all of the claimed motion. Applicant appears to be trying to argue that there are 4 or 5 movements occurring (see Figure 9 and 10, movement axes X, Y, alpha, beta, and gamma and see also specification, paragraphs 0082-83), but does not use claim language that does not make these movements clearly distinct from each other. Rather, applicant merely claims three motors, with movement capabilities that can be achieved by the motors of Jang or Sekiya.

8. In any event, Sekiya has been alternatively applied to disclose rotational motors in the context of the control of a ink-jet head for deposition onto a substrate in the art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George R. Koch III whose telephone number is (571) 272-1230 (TDD only). If the applicant cannot make a direct TDD-to-TDD call, the applicant can communicate by calling the Federal Relay Service at 1-866-377-8642 and giving the operator the above TDD number. The examiner can normally be reached on M-F 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christopher Fiorilla can be reached on (571) 272-1187. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

George R. Koch III
Primary Examiner
Art Unit 1734

GRK
3/5/2006